

WHAT IS CLAIMED IS:

1. A yellow phosphor represented by the following chemical formula 1:

Chemical formula 1



5 wherein, A is at least one element selected from the group consisting of Y, Lu, Sc, La, Gd and Sm; D is at least one element selected from the group consisting of Al, Ga and In; E is at least one element selected from the group consisting of B and Fe;  $0 \leq x < 0.5$ ; and  $0.0001 \leq y < 0.5$ .

10 2. The yellow phosphor according to claim 1, wherein the phosphor has an absorption peak ranging from about 420 nm to 480 nm, and an emission peak ranging from about 510 nm to 570 nm.

3. The yellow phosphor according to claim 1, wherein A is a mixture of Y and Gd.

15 4. The yellow phosphor according to claim 1, wherein the phosphor is of a spherical shape, and its mean diameter is 100 nm to 50  $\mu m$ .

5. A white semiconductor light emitting device comprising:  
a semiconductor light emitting diode; and  
a phosphor coating layer comprising a yellow phosphor which absorbs a portion of light emitted by the semiconductor light emitting diode and emits light of  
20 wavelength different from that of the absorbed light and a transparent resin, where the yellow phosphor is represented by the following chemical formula 1:

Chemical formula 1



wherein: A is at least one element selected from the group consisting of Y, Lu, Sc, La, Gd and Sm; D is at least one element selected from the group consisting of Al, Ga and In; E is at least one element selected from the group consisting of B and Fe;  $0 \leq x < 0.5$ ; and  $0.0001 \leq y < 0.5$ ;

5           6. The white semiconductor light emitting device according to claim 5, wherein the thickness of the phosphor coating layer ( $T_1$ ) and the thickness of the semiconductor light emitting diode ( $T_2$ ) meet the formula of  $T_2 < T_1 \leq 3T_2$ .

7. The white semiconductor light emitting device according to claim 5, wherein the yellow phosphor contains phosphor with mean diameter of less than 1  
10  $\mu\text{m}$  in an amount of 0.01 to 10 wt%, and phosphor with mean diameter of 1 to 50  $\mu\text{m}$  in an amount of 90 to 99.9 wt%.

8. The white semiconductor light emitting device according to claim 5, wherein the phosphor coating layer comprises a lower part including the phosphor with mean diameter of 1 to 50  $\mu\text{m}$ , and a upper part including the phosphor with  
15 mean diameter of less than 1  $\mu\text{m}$ .

9. The white semiconductor light emitting device according to claim 5, wherein the phosphor coating layer further comprises a zinc selenium-based red phosphor.

10. The white semiconductor light emitting device according to claim 9,  
20 wherein the amount of the zinc selenium-based red phosphor is 10 to 40 wt% based on the weight of the yellow phosphor.

11. The white semiconductor light emitting device according to claim 5, wherein the semiconductor light emitting diode comprises a substrate and a nitride

semiconductor layer on the substrate.

12. The white semiconductor light emitting device according to claim 11, wherein the substrate is made of sapphire or silicone carbide.

13. The white semiconductor light emitting device according to claim 11,  
5 wherein the nitride semiconductor layer includes a GaN, InGaN, or AlGaInN-based semiconductor.

14. The white semiconductor light emitting device according to claim 5, wherein the transparent resin is a transparent epoxy resin or a silicone resin.

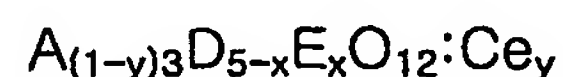
15. A lead type white semiconductor light emitting device comprising:  
10 a mount lead comprising a lead and a recess portion on the lead;  
a UV or a blue LED chip which is disposed in the recess portion, and an anode, a cathode of which are connected to the lead of the mount lead by metal wires;

a phosphor coating layer filled inside the recess portion to cover the LED  
15 chip; and

a casing that seals the mount lead excluding lower portions of the mount lead, the LED chip and phosphor coating layer,

wherein the phosphor coating layer comprises a transparent resin and a yellow phosphor represented by the following chemical formula 1:

20 Chemical formula 1



Wherein, A is at least one element selected from the group consisting of Y, Lu, Sc, La, Gd and Sm; D is at least one element selected from the group consisting of Al, Ga and In; E is at least one element selected from the group consisting of B and Fe;

$0 \leq x < 0.5$ ; and  $0.0001 \leq y < 0.5$ ;

16. The white semiconductor light emitting device according to claim 15, wherein the phosphor coating layer further comprises a zinc selenium-based red phosphor.

5 17. The white semiconductor light emitting device according to claim 15, which further comprises a transparent material layer between the semiconductor light emitting diode and the phosphor coating layer.

18. A lead type white semiconductor light emitting device comprising:

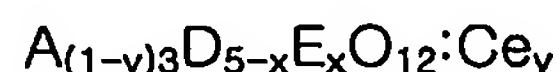
a casing with a recess portion on its top, and metal lead;

10 a UV and a blue LED chip which is disposed in the recess portion, and an anode and a cathode of which are connected to the lead by metal wires; and

a phosphor coating layer filled inside the recess portion to cover the LED chip,

15 wherein, the phosphor coating layer comprises a transparent resin and a yellow phosphor represented by the following chemical formula 1,

Chemical formula 1



20 wherein: A is at least one element selected from the group consisting of Y, Lu, Sc, La, Gd and Sm; D is at least one element selected from the group consisting of Al, Ga and In; E is at least one element selected from the group consisting of B and Fe;

$0 \leq x < 0.5$ ; and  $0.0001 \leq y < 0.5$ ;

19. The white semiconductor light emitting device according to claim 18, wherein the phosphor coating layer further comprises a zinc selenium-based red

phosphor.

20. The white semiconductor light emitting device according to claim 18, which further comprises a transparent material layer between the semiconductor light emitting device and the phosphor coating layer.

5 21. The white semiconductor light emitting device according to claim 18, which further comprises a transparent molding layer on the phosphor coating layer.

22. A surface mount type white semiconductor light emitting device of the PCB (printed circuit board) type comprising a UV and blue LED chip and a phosphor coating layer formed orderly on a PCB layer, wherein the phosphor  
10 coating layer comprises yellow phosphor represented by the following chemical formula 1:

Chemical formula 1.



Wherein, A is at least one element selected from the group consisting of Y, Lu, Sc,  
15 La, Gd and Sm; D is at least one element selected from the group consisting of Al, Ga and In; E is at least one element selected from the group consisting of B and Fe;  
 $0 \leq x < 0.5$ ; and  $0.0001 \leq y < 0.5$ ;

23. The white semiconductor light emitting device according to claim 22, wherein the phosphor coating layer further comprises a zinc selenium-based red  
20 phosphor.

24. The white semiconductor light emitting device according to claim 22, which further comprises a transparent molding layer on the phosphor coating layer.

25. A liquid crystal display incorporating the white semiconductor light

emitting device according to any one of claims 5 to 14 as a back light source.